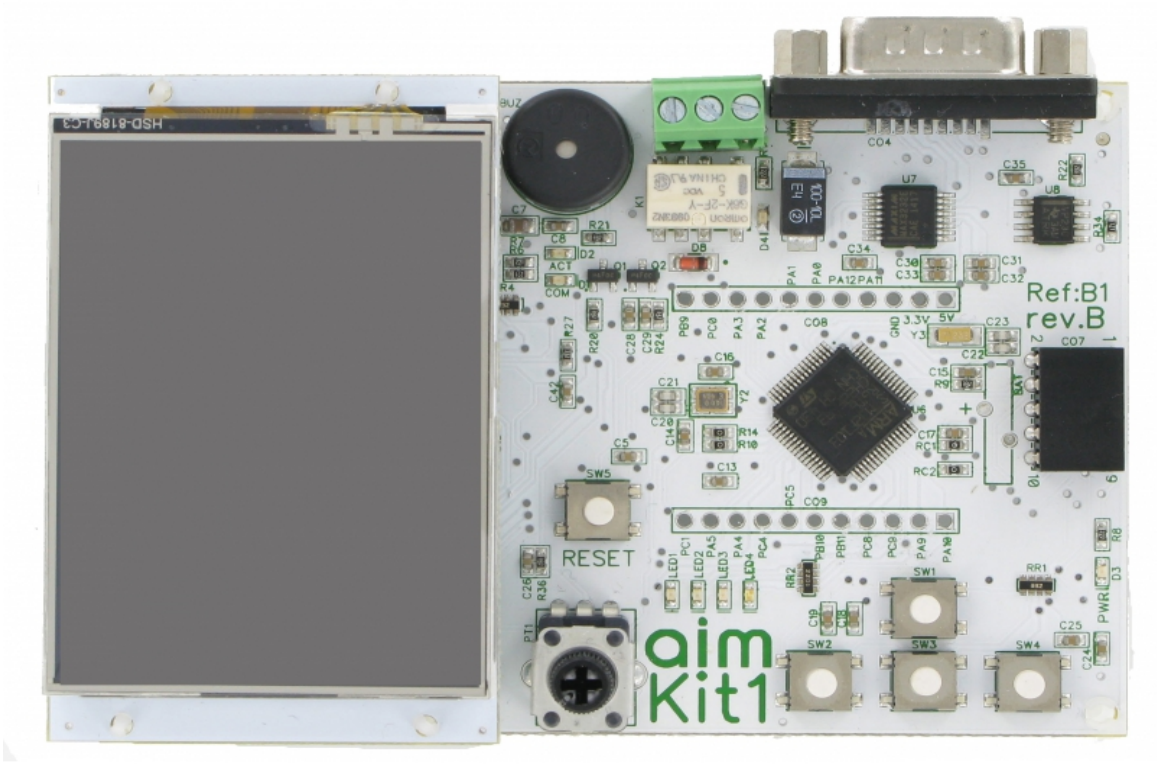
AIM
AIM-Kit1 Evaluation Board



Revision	Date	Author	Comments
1	02/09/14	SF	Initial version
2	12/09/2014	GHP	Rereading
3	25/02/15	MB	Translation

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Introduction

The **AIM-Kit1** evaluation board is available with six different STM32 microcontrollers and has a large range of inputs and outputs allowing the creation of simple automated systems using the program µO**ne** tm and/or AGILIA tm.

The extension ports on the card give access to the different GPIOs of the microcontroller, enabling the connection of daughterboards and the addition of supplementary functions.

This technical document presents the electronics of the board and supplies the information needed for proper use.

Presentation

The AIM-Kit is an evaluation board for the programs µOne/AGILIA. There are six versions:

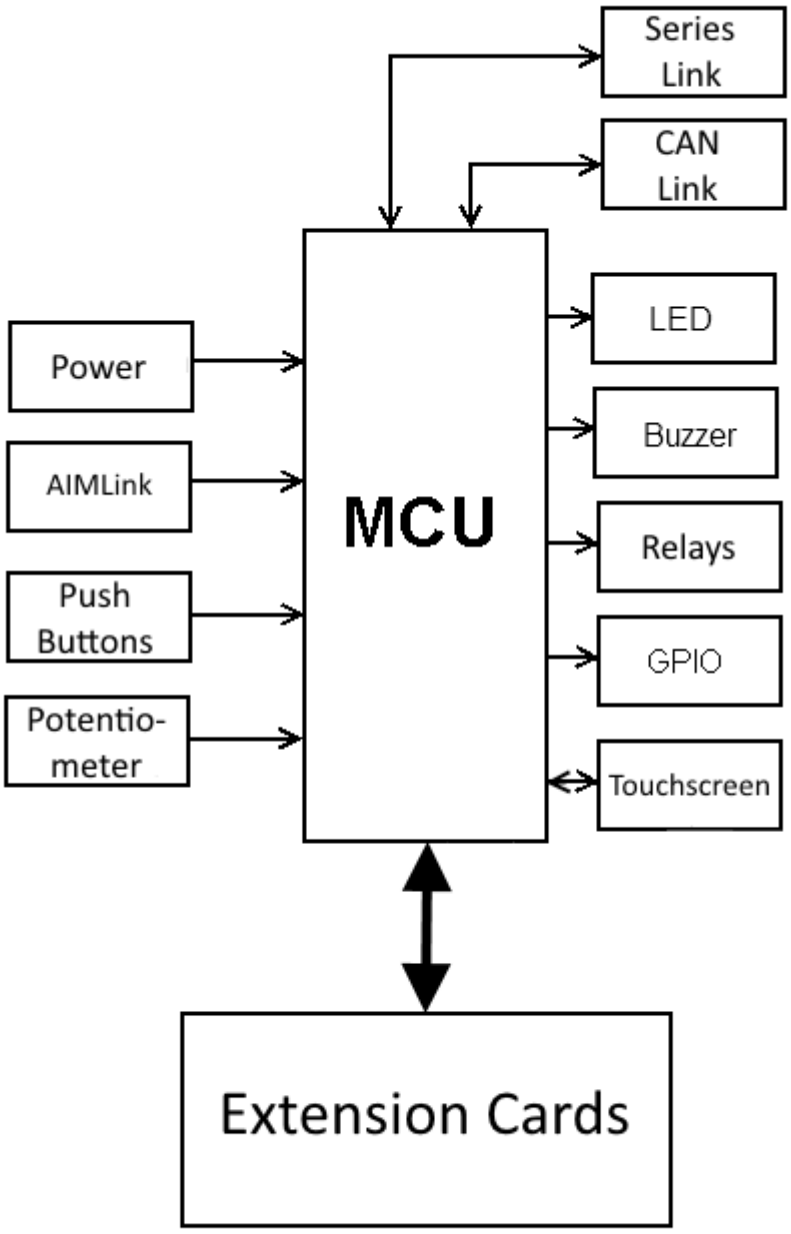
- AIM-Kit-F051: microcontroller STM32F051R8T6
- AIM-Kit-F103: microcontroller STM32F103RGT6
- AIM-Kit-F205: microcontroller STM32F205RGT6
- AIM-Kit-F405: microcontroller STM32F405RGT6
- AIM-Kit-F415: microcontroller STM32F415RGT6
- AIM-Kit-L152: microcontroller STM32L152RBT6

The AIM-Kit evaluation boards have the following elements:

Micro-controller	**SRAM**	**Flash**
STM32F051R8T6	8 KB	64 KB
STM32F103RGT6	96 KB	1024 KB
STM32F205RGT6	128 KB	1024 KB
STM32F405RGT6	192 KB	1024 KB
STM32F415RGT6	192 KB	1024 KB
STM32L152RBT6	16 KB	128 KB

- Oscillator HSE: 16 MHz
- Oscillator RTC: 32 768 Hz
- 1x RS232
- 1x CAN (Except F051, L152)
- 4x buttons
- 4x LEDs
- 1x potentiometer
- 1x relay
- 1x piezoelectric transducer (buzzer)
- 1x RTC battery connector (not mounted)
- 2x extension connectors
- 1x 2.4" touch-screen (Except F051)

Hardware block diagram



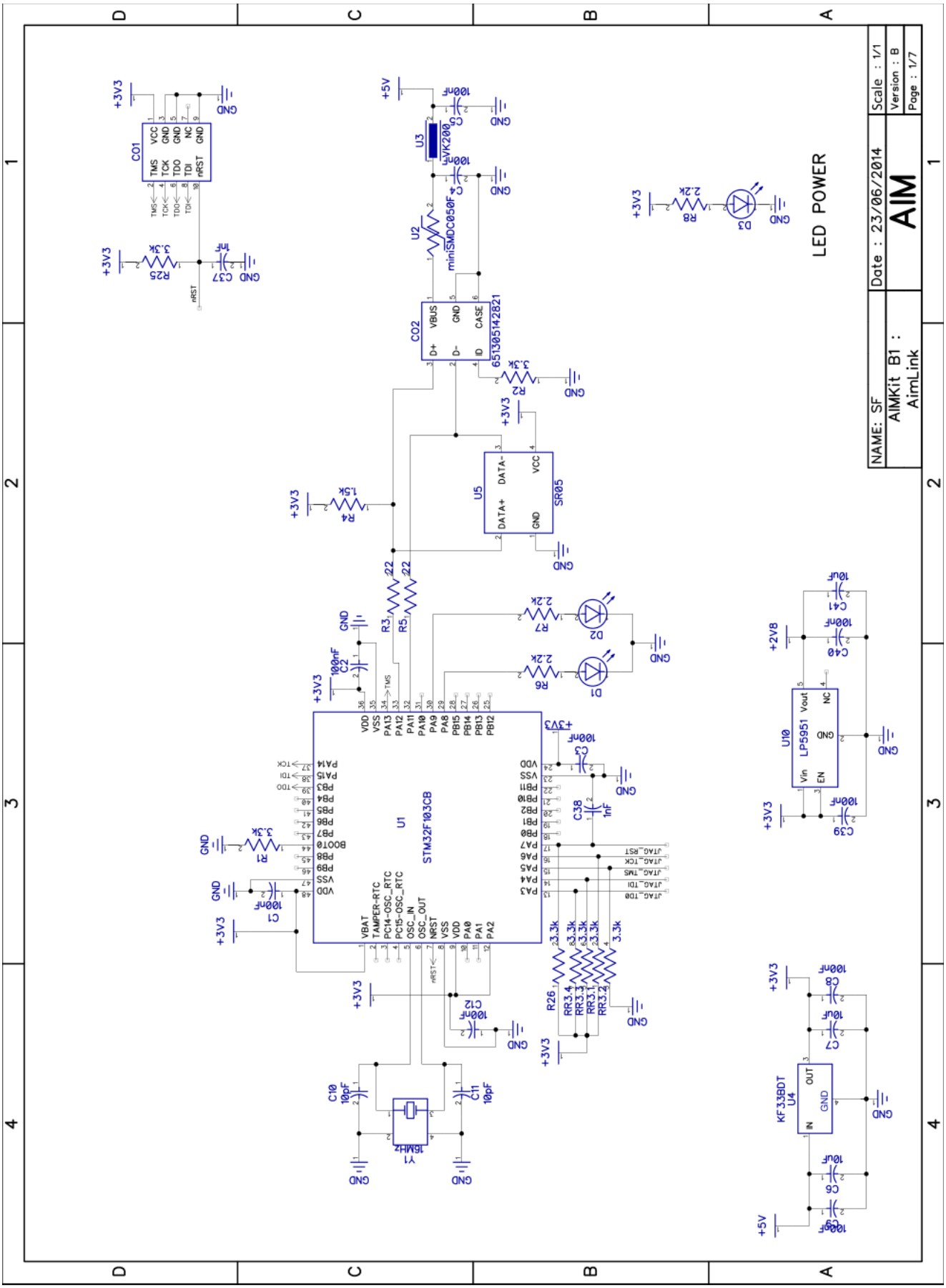
Description of available functions

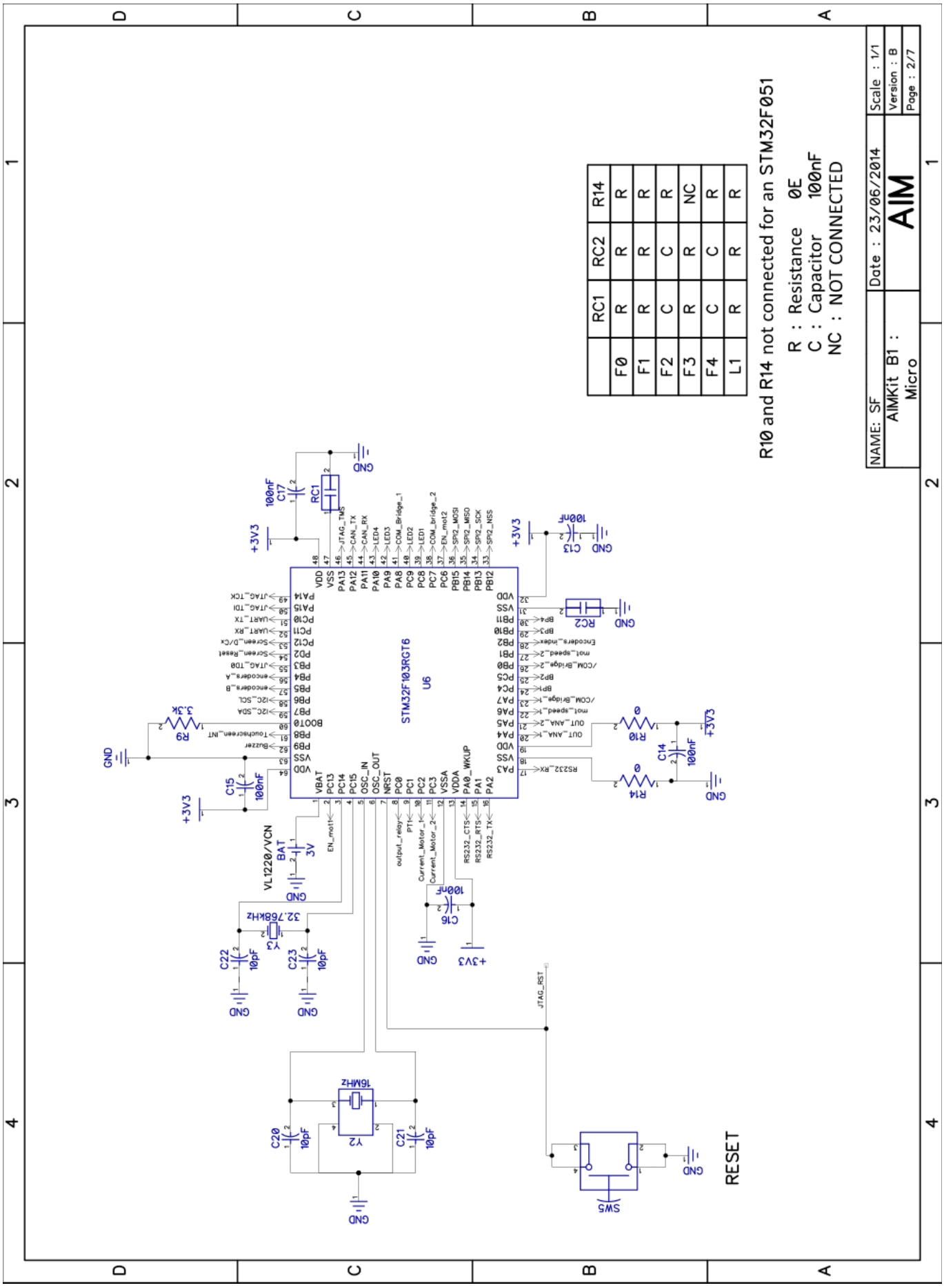
- **Push buttons:** The board has four digital inputs in the form of four push buttons, there is a fifth push button to reset the card.
- **LED:** There are four LEDs, in order to simulate four digital outputs and to obtain visual feedback.
- **Potentiometer:** The board has a potentiometer to simulate analogue inputs.
- **Buzzer:** The board has a buzzer in order to provide audio feedback.
- **Relays:** The board has a two pole relay to simulate a digital output.
- **RTC:** This board has a real time clock, that is embedded in the micro-controller. A battery to save data (not supplied) can be mounted. (ref. CR-1220/VCN).
- **Serial communication:** The kit integrates two types of serial bus: a CAN link (Except F051 and L152) and an RS232 link. The card can thus communicate with other systems. Warning: The CAN bus connector (CO4) does not use a conventional pin configuration, pins 4 and 6 are used instead of 2 and 7. Refer to the diagram on page 12 for more information.
- **Touchscreen:** The board has a 2.4” colour touch-screen in order to implement a GUI (Graphical User Interface). (Except for F051)
- **AIMLink:** The board integrates an AIMLink probe to program the microcontroller memory and to develop programs.
- **Extension ports:** The board has two connectors, one on each side, in order to connect one or two extension cards.

Assignment of micro-controller ports

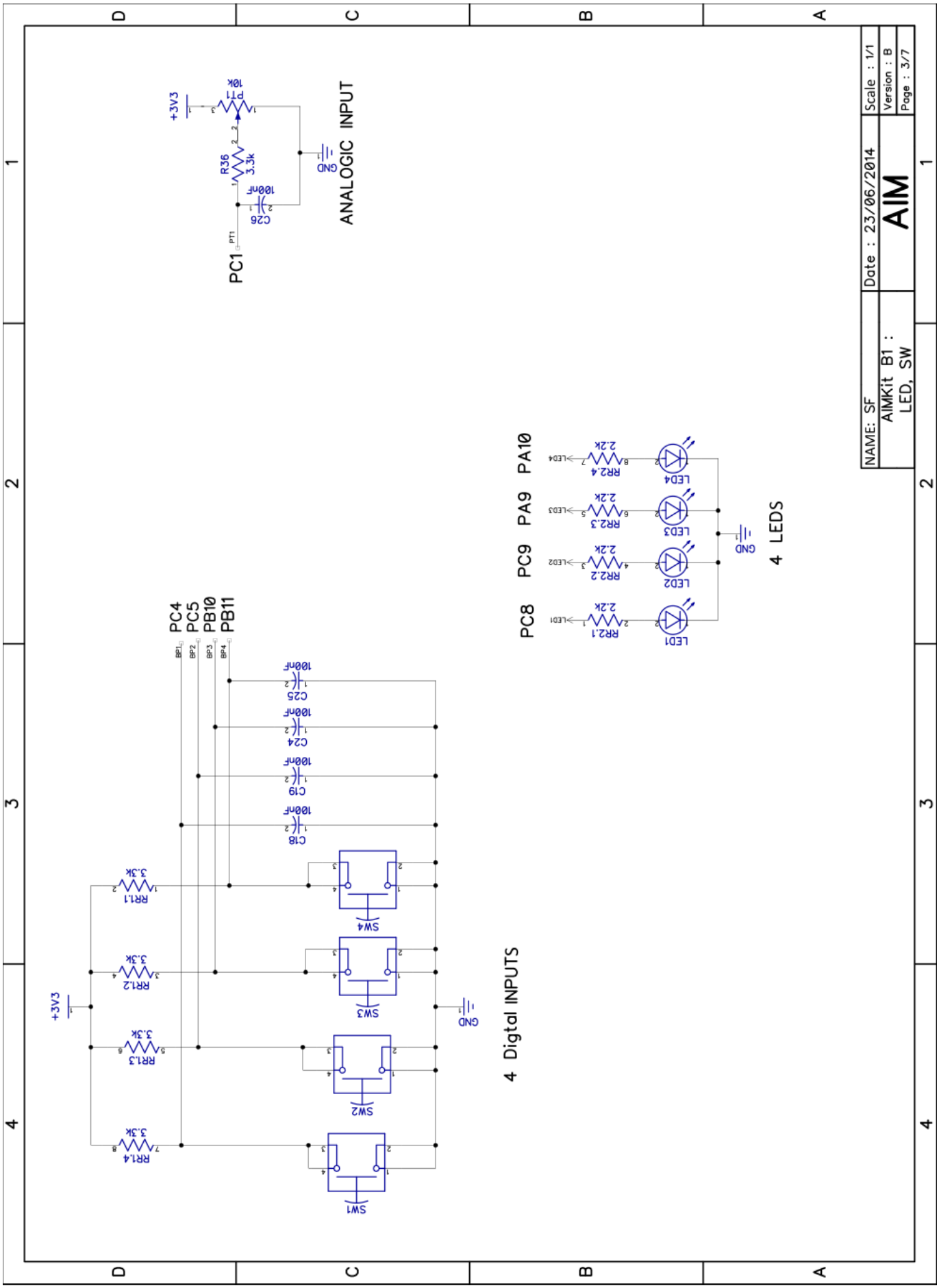
Port	Assignment	Comments	Connector
PA0	USART2 /CTS	Series link	CO8:6
PA1	USART2 /RTS	Series link	CO8:7
PA2	USART2 TX	Series link	CO8:8
PA3	USART2 RX	Series link	CO8:9
PA4	DAC_OUT1	Analogue output n°1	CO9:9/CO6:15
PA5	DAC_OUT2	Analogue output n°2	CO9:10/CO6:16
PA6	TIM3_CH1	Motor speed n°1	CO6:7
PA7	TIM1 CH1N (out)	Motor control n°1	CO6:8
PA8	TIM1 CH1 (out)	Motor control n°1	CO6:9
PA9	GPIO Out / TIM1-CH2	LED 3	CO9:2
PA10	GPIO Out / TIM1-CH3	LED 4	CO9:1
PA11	CAN RX	CAN link	CO8:4
PA12	CAN TX	CAN link	CO8:5
PA13	SWIO	JTAG/SWD	
PA14	TCK	JTAG/SWD	
PA15	TDI	JTAG/SWD	
PB0	TIM8 CH2N (out)	Motor control n°2	CO6:10
PB1	TIM8_CH4	Motor speed n°2	CO6:11
PB2	GPIO In / EXTI2	Incremental encoder : Index	CO6:13
PB3	TDO	JTAG/SWD	
PB4	TIM3_CH1 (in)	Incremental encoder : Phase A	CO6:4
PB5	TIM3_CH2 (in)	Incremental encoder : Phase B	CO6:3
PB6	I2C1 SCL	Touch screen driver STMPE811	CO5:6
PB7	I2C1 SDA	Touch screen driver STMPE811	CO5:5
PB8	GPIO In / EXTI8	Touch screen driver STMPE811	CO5:4
PB9	TIM4_CH4 (out)	Buzzer	CO8:11
PB10	GPIO In / EXTI10	Push button SW3	CO9:6
PB11	GPIO In / EXTI11	Push button SW4	CO9:5
PB12	SPI2 NSS (out)	Touchscreen	CO5:1
PB13	SPI2 SCK	Touchscreen	CO5:2
PB14	SPI2 MISO	Touchscreen	CO5:13
PB15	SPI2 MOSI	Touchscreen	CO5:14
PC0	GPIO Out	Relay output	CO8:10
PC1	ADC1 In11	Potentiometer	CO9:11
PC2	ADC2 In12	Motor current n°1	CO6:5
PC3	ADC2 In13	Motor current n°2	CO6:6
PC4	GPIO In / EXTI4	Push button SW1	CO9:7
PC5	GPIO In / EXTI5	Push button SW2	CO9:8
PC6	GPIO Out	Motor enable n°2	CO6:14
PC7	TIM8 CH2 (out)	Motor control n°2	CO6:12
PC8	GPIO Out / TIM3-CH3	LED 1	CO9:4
PC9	GPIO Out / TIM3-CH4	LED 2	CO9:3
PC10	UART4_TX	UART	CO7:4
PC11	UART4_RX	UART	CO7:3
PC12	GPIO Out	Touchscreen	CO5:11
PC13	GPIO Out	Motor enable n°1	CO6:2
PD2	GPIO Out	Touchscreen	CO5:3
PC14	OSC32 In	RTC	
PC15	OSC32 Out	RTC	
PD0	OSC In	HSE	
PD1	OSC Out	HSE	

Schematics


LED POWER
NAME: SF
AIMKit B1 : AimLink
Date : 23/06/2014
AIM
Scale : 1/1
Version : B
Page : 1/7
STM32F103CB
LP5951
KF33BDT
SR05
miniSMDC050F
65130514282I



	RC1	RC2	R14
F0	R	R	R
F1	R	R	R
F2	C	C	R
F3	R	R	NC
F4	C	C	R
L1	R	R	R


ANALOGIC INPUT
+3V3
10k
PT1
R36
3.3k
100nF
C26
GND
PC1
4 LEDS
PA10
PA9
PC9
PC8
LED4
LED3
LED2
LED1
2.2k
RR2.4
RR2.3
RR2.2
RR2.1
4 Digtal INPUTS
PC4
PC5
PB10
PB11
SW1
SW2
SW3
SW4
3.3k
RR1.4
RR1.3
RR1.2
RR1.1
C18
C19
C24
C25
NAME: SF
AIMKit B1 : LED, SW
Date : 23/06/2014
AIM
Scale : 1/1
Version : B
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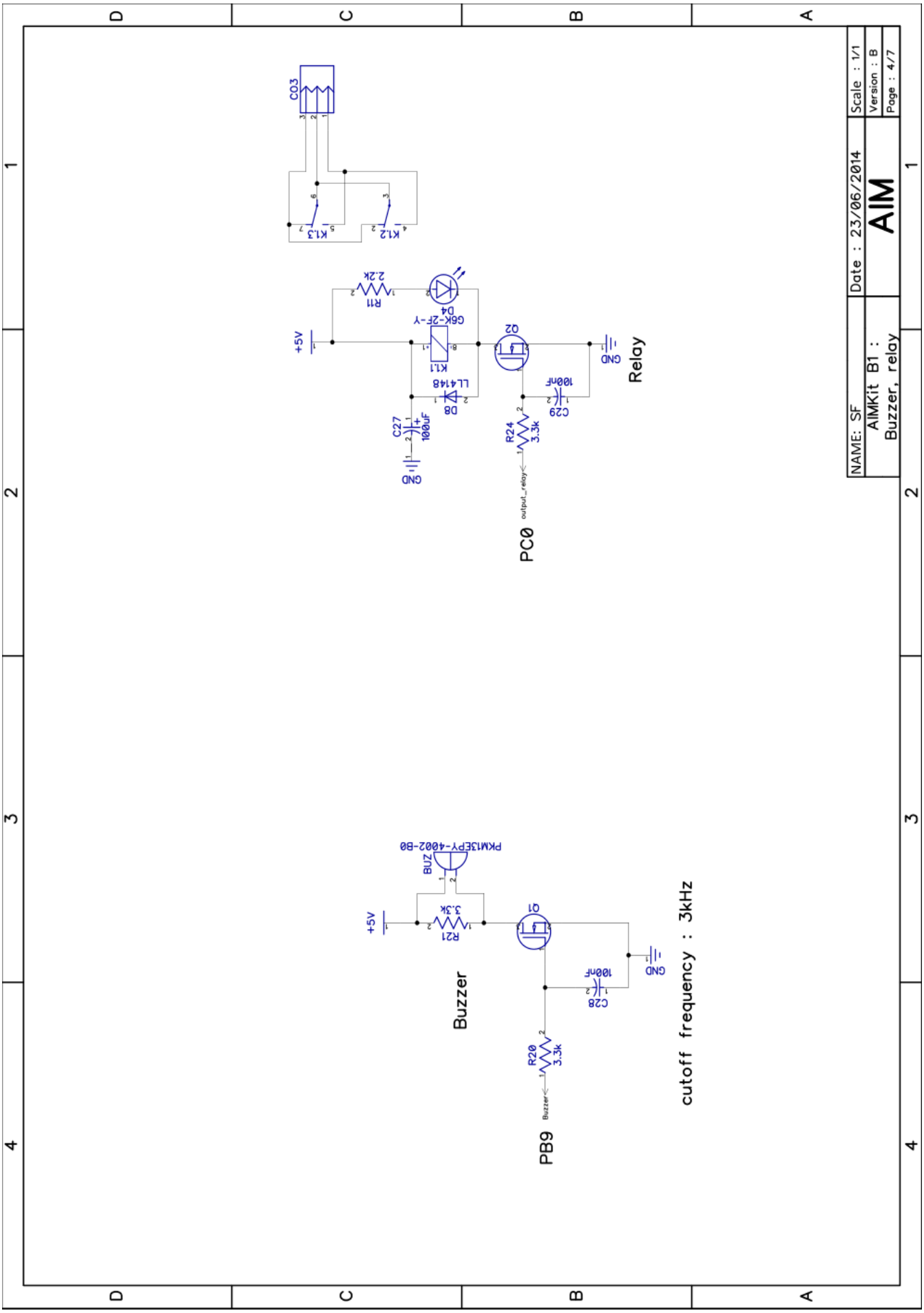
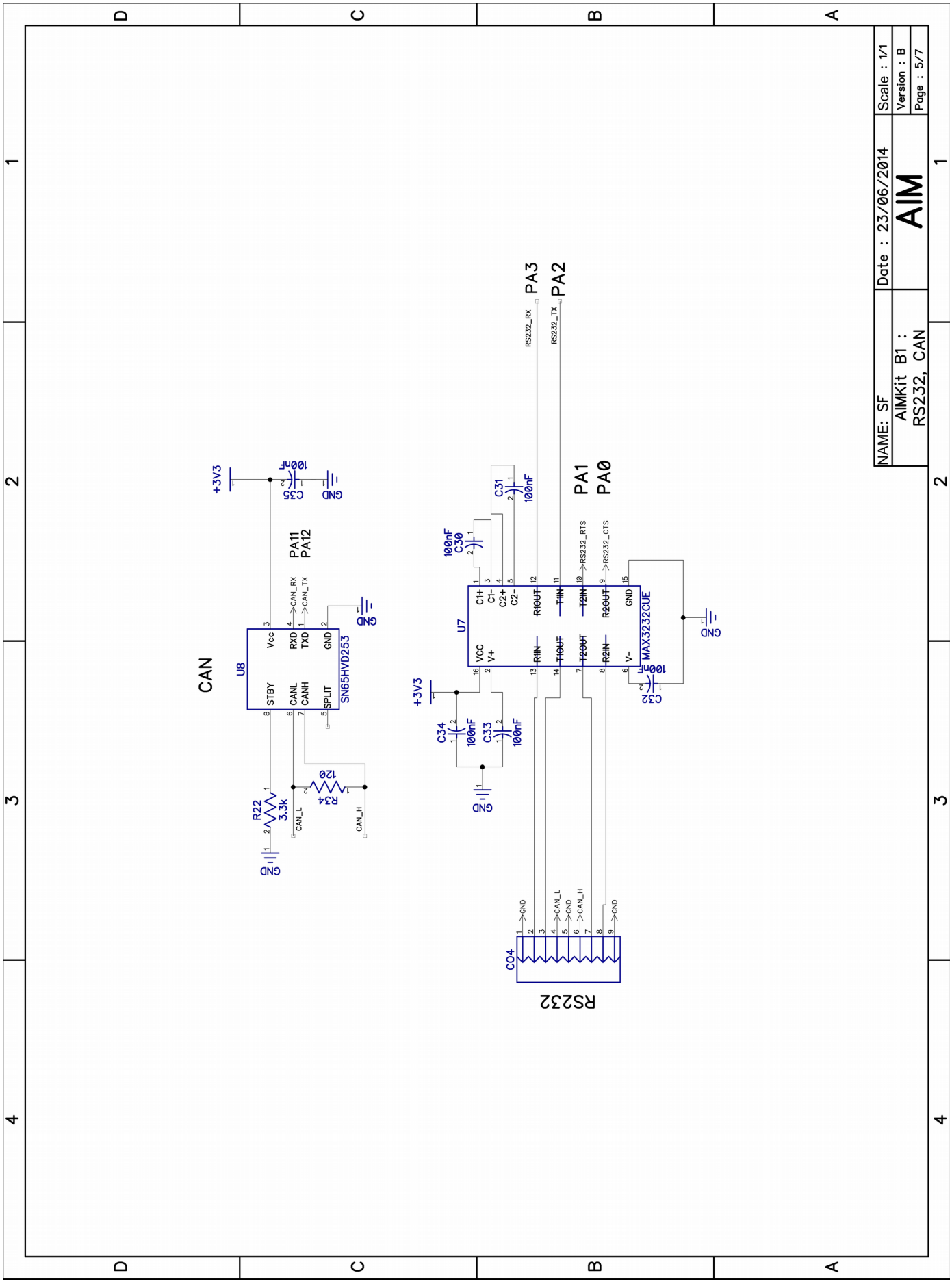

NAME: SF
AIMKit B1 : Buzzer, relay
Date : 23/06/2014
AIM
Scale : 1/1
Version : B
Page : 4/7
CO3
K1.3
K1.2
R11
2.2k
D4
G6K-2F-Y
K1.1
+5V
Q2
GND
LL4148
D8
100nF
C29
C27
100uF
R24
3.3k
output_relay
PC0
Relay
PKM13EPY-4002-B0
BUZ
R21
3.3k
Q1
C28
100nF
R20
3.3k
Buzzer
PB9
cutoff frequency : 3kHz


NAME: SF
Date : 23/06/2014
AIM
Scale : 1/1
Version : B
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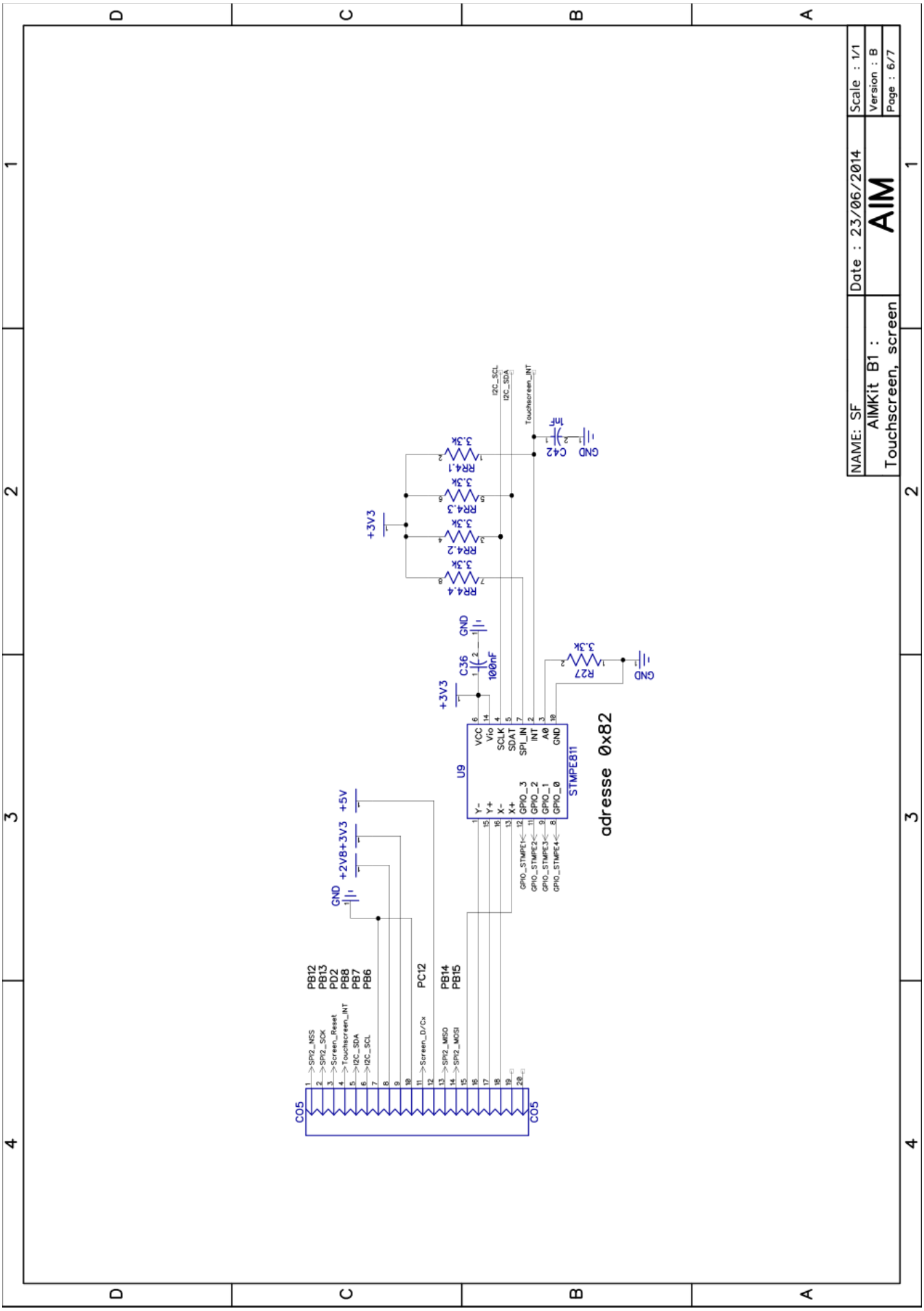
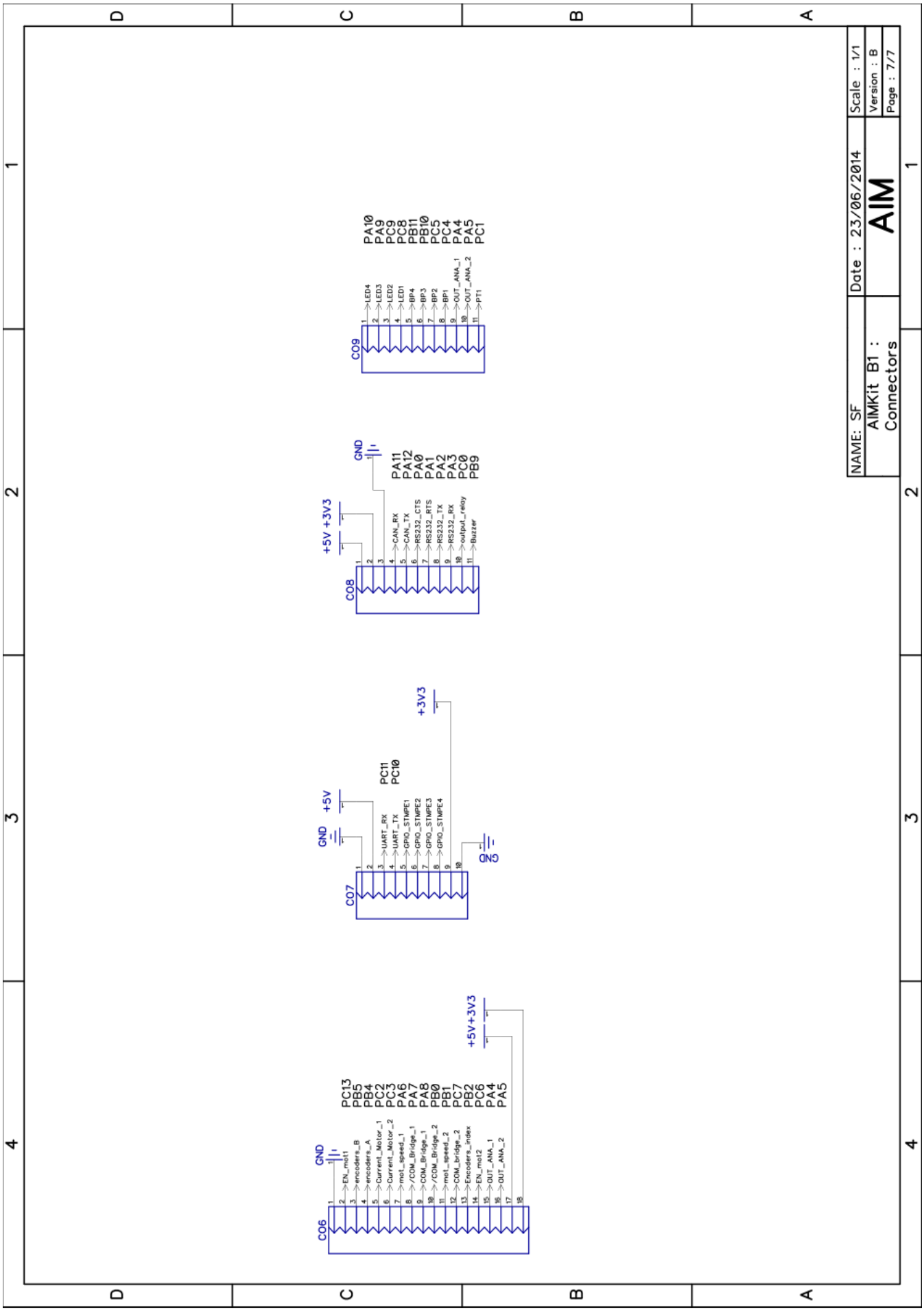
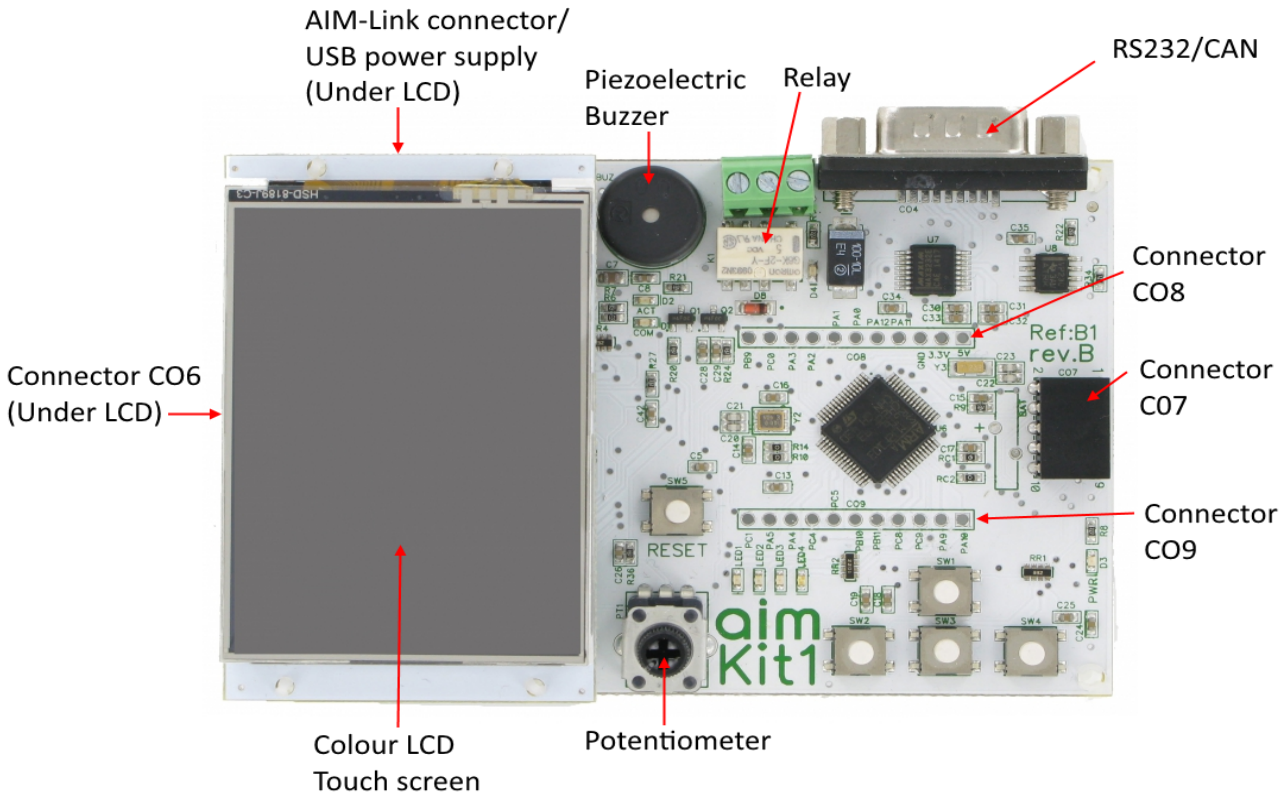
AIMKit B1 : RS232, CAN
CAN
RS232
U8
SN65HVD253
U7
MAX3232CUE
CO4
PA11
PA12
PA3
PA2
PA1
PA0
+3V3
GND
R22 3.3k
R34 120
C35 100nF
C30 100nF
C31 100nF
C34 100nF
C33 100nF
C32 100nF
CAN_L
CAN_H
RS232_RX
RS232_TX
RS232_RTS
RS232_CTS


NAME: SF
AIMKit B1 : Touchscreen, screen
Date : 23/06/2014
AIM
Scale : 1/1
Version : B
Page : 6/7
adresse 0x82
U9
STMPE811
C36
100nF
C42
1nF
R27
3,3k
RR4.1
RR4.2
RR4.3
RR4.4
+3V3
+5V
+2V8
GND
CO5
PB12
PB13
PD2
PB8
PB7
PB6
PC12
PB14
PB15
SPI2_NSS
SPI2_SCK
Screen_Reset
Touchscreen_INT
I2C_SDA
I2C_SCL
Screen_D/Cx
SPI2_MISO
SPI2_MOSI


NAME: SF
AIMkit B1 : Connectors
Date : 23/06/2014
AIM
Scale : 1/1
Version : B
Page : 7/7
CO9
LED4
LED3
LED2
LED1
BP4
BP3
BP2
BP1
OUT_ANA_1
OUT_ANA_2
PT1
PA10
PA9
PC9
PC8
PB11
PB10
PC5
PC4
PA4
PA5
PC1
CO8
GND
+5V +3V3
CAN_RX
CAN_TX
RS232_CTS
RS232_RTS
RS232_TX
RS232_RX
output_relay
Buzzer
PA11
PA12
PA0
PA1
PA2
PA3
PC0
PB9
CO7
GND
+5V
+3V3
UART_RX
UART_TX
GPIO_STMPE1
GPIO_STMPE2
GPIO_STMPE3
GPIO_STMPE4
PC11
PC10
CO6
GND
+5V+3V3
EN_mot1
encoders_B
encoders_A
Current_Motor_1
Current_Motor_2
mot_speed_1
/COM_Bridge_1
COM_Bridge_1
/COM_Bridge_2
mot_speed_2
COM_bridge_2
Encoders_index
EN_mot2
OUT_ANA_1
OUT_ANA_2
PC13
PB5
PB4
PC2
PC3
PA6
PA7
PA8
PB0
PB1
PC7
PB2
PC6
PA4
PA5

Connectors



USB: CO5

Pin	Description
1	5V
2	D-
3	D+
4	NC
5	GND

Relay: CO3

Pin	Description
1	Active position
2	Active/rest position
3	Rest position

Series link: CO4

Pin	Description
1	GND
2	RS232: RX
3	RS232: TX
4	CAN_H (Except L152, F051)
5	GND
6	CAN_L (Except L152, F051)
7	RS232: RTS
8	RS232: CTS
9	GND

Touchscreen: CO5 (Except F051)

Pin	Description
1	SPI2_NSS (/CS)
2	SPI2_SCK
3	Screen_reset
4	Touch-screen_INT
5	I2C_SDA
6	I2C_SCL
7	GND
8	2.8V
9	3.3V
10	GND
11	Screen_D/Cx
12	5V
13	SPI2_MISO
14	SPI2_MOSI
15	X+
16	Y-
17	Y+
18	X-
19	NC
20	NC

Right extension: CO6

Pin	Description
1	GND
2	EN_mot1
3	encoders_B
4	encoders_A
5	Current_Motor_1
6	Current_Motor_2
7	mot_speed_1
8	/COM_Bridge_1
9	COM_Bridge_1
10	/COM_Bridge_2
11	mot_speed_2
12	COM_bridge_2
13	Encoders_Index
14	EN_mot2 /
15	OUT_ANA_1
16	OUT_ANA_2
17	5V
18	3.3V

Left extension: CO7

Pin	Description
1	GND
2	5V
3	UART_RX
4	UART_TX
5	GPIO_STMPE1
6	GPIO_STMPE2
7	GPIO_STMPE3
8	GPIO_STMPE4
9	3.3V
10	GND

GPIO connector: CO8

Pin	Description
1	5V
2	3.3V
3	GND
4	CAN_RX (Except F051, L152)
5	CAN_TX (Except F051, L152)
6	RS232_CTS
7	RS232_RTS
8	RS232_TX
9	RS232_RX
10	Output_relay
11	Buzzer

GPIO connector: CO9

Pin	Description
1	LED4
2	LED3
3	LED2
4	LED1
5	BP4
6	BP3
7	BP2
8	BP1
9	OUT_ANA_1
10	OUT_ANA_2
11	PT1

Electrical specification

Supply voltage: 5Vdc (typical) by USB connector.

Supply power: 2W (typical).

Relay switching capacity:
- AC: 0.3A 125Vac
- DC: 1A 30Vdc

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